Claims:

1. An electrospray source, comprising:

a contiguous capillary for separating and electrospraying a fluid comprising analyte and electrolyte, said contiguous capillary comprising:

a spray tip at one end of said capillary; and

an electrically conductive portion of the capillary in proximity to said spray tip, said electrically conductive portion capable of blocking passage of analyte therethrough.

2. The electrospray source of claim 1, wherein the electrically conductive portion comprises pores of a size that permit passage of electrolyte therethrough.

3. The electrospray source of claim 1, wherein the electrically conductive portion is electrolytically conductive.

4. The electrospray source of claim 1, wherein the contiguous capillary comprises fused silica.

5. The electrospray source of claim 1, wherein the spray tip has an opening smaller than about 50 microns.

6. The electrospray source of claim 2, wherein the pores permit passage of electrolyte ions having a molecular mass of less than about 300 g/mol.

7. The electrospray source of claim 2, wherein the pores at least partially block the passage of analyte.

8. The electrospray source of claim 7, wherein the pores completely block the passage of analyte ions having a molecular mass of greater than about 100 g/mol.

9. The electrospray source of claim 1, wherein the electrically conductive portion is affixed within a support structure, said support structure capable of holding a buffer solution.

10. The electrospray source of claim 1, wherein the electrically conductive portion of the capillary comprises at least about 1 mm of the length of the capillary.

11. The electrospray source of claim 1, wherein the electrically conductive portion of the capillary has a wall thickness less than the wall thickness of the adjacent capillary portion.

12. The electrospray source of claim 11, wherein the wall thickness of the electrically conductive portion of the capillary is less than about 50 microns.

13. The electrospray source of claim 1, wherein the diameter of the spray tip opening is smaller than inside diameter of the capillary.

14. A contiguous capillary for electrospraying a fluid comprising analyte and electrolyte, the capillary comprising:

an inlet end to supply fluid into the capillary;

a spray tip for spraying fluid out of the capillary; and

an electrically conductive portion of the capillary in proximity to said spray tip, said electrically conductive portion capable of blocking passage of analyte therethrough.

15. The contiguous capillary of claim 14, wherein the electrically conductive portion comprises pores of a size that permit passage of electrolyte therethrough.

16. The contiguous capillary of claim 14, wherein the electrically conductive portion is electrolytically conductive.

17. The contiguous capillary of claim 14, wherein the contiguous capillary comprises fused silica.

18. The contiguous capillary of claim 14, wherein the spray tip has a diameter opening of less than about 50 microns.

19. The contiguous capillary of claim 15, wherein the pores permit passage of electrolyte ions having a molecular mass of less than about 300 g/mol.

20. The contiguous capillary of claim 15, wherein the pores at least partially block the passage of analyte.

21. The contiguous capillary of claim 20, wherein the pores completely block the passage of analyte ions having a molecular mass of greater than about 300 g/mol.

22. The contiguous capillary of claim 14, wherein the electrically conductive portion is affixed within a support structure, said support structure capable of holding a buffer solution.

23. The contiguous capillary of claim 14, wherein the electrically conductive portion of the capillary comprises at least about 1 mm of the length of the capillary.

24. The contiguous capillary of claim 14, wherein the electrically conductive portion of the capillary has a wall thickness less than the wall thickness of the adjacent capillary portion.

25. The contiguous capillary of claim 14, wherein the wall thickness of the electrically conductive portion of the capillary is less than about 50 microns.

26. The contiguous capillary of claim 14, wherein the diameter of the spray tip opening is smaller than the inside diameter of the capillary.

27. An apparatus for conveying analyte ions into an analytical instrument, the apparatus comprising:

a contiguous capillary, comprising:

an inlet end to supply a fluid into the capillary, said fluid comprising analyte and electrolyte;

a spray tip to spray fluid out of the end of the capillary that is opposite to the inlet end; and

an electrically conductive portion of the capillary in proximity to said spray tip, said electrically conductive portion capable of blocking passage of analyte therethrough;

an electrode exterior to said electrically conductive portion, said electrode being in electrically conductive contact with the fluid interior to said electrically conductive portion;

a spray counter-electrode in proximity to said spray tip, said spray counter-electrode comprising an opening in fluid communication with the analytical instrument; and

a power supply connected to the electrode and the spray counter-electrode, said power supply providing a spray voltage for generating an electrospray comprising analyte ions, whereby at least a portion of the analyte ions are conveyed through said opening and into the analytical instrument.

28. The apparatus of claim 27, wherein the electrically conductive portion of the capillary comprises pores of a size that permit passage of electrolyte therethrough.

29. The apparatus of claim 27, wherein the electrically conductive portion of the capillary is electrolytically conductive.

30. The apparatus of claim 27, further comprising:

a second electrode in electrically conductive contact with fluid upstream from the electrically conductive portion of the capillary; and

a second power supply to produce an electrophoresis voltage between the electrode and said second electrode to effect electrophoresis separation of the analytes within the capillary.

31. The apparatus of claim 27, wherein the second electrode is in electrolytically-conductive contact with the fluid adjacent to the inlet end of the capillary.

32. The apparatus of claim 27, wherein the capillary further comprises a second electrically conductive portion through which the second electrode is in electrically conductive contact with the fluid, said second electrically conductive portion being located upstream or downstream from the first electrically conductive portion.

33. The apparatus according to claim 27, wherein the analytical instrument is a mass spectrometer or a mass analyzer.

35. A method of making a contiguous capillary suitable for separating and electrospraying a fluid comprising analyte and electrolyte, the method comprising:
providing a capillary having an inlet end and a spray tip end;
etching a portion of the capillary wall in proximity to said spray tip end to provide an electrically conductive portion of the capillary, said electrically conductive portion capable of blocking passage of analyte therethrough; and
forming a spray tip at the spray tip end of the capillary.

36. The method according to claim 35, wherein the electrically conductive portion comprises pores of a size that permit passage of electrolyte therethrough.

37. The method according to claim 35, wherein the electrically conductive portion is electrolytically conductive.

38. The method according to claim 35, wherein the capillary comprises fused silica.

39. The method according to claim 35, wherein the etching comprises contacting the portion of the capillary with an etching fluid capable of dissolving the capillary.

40. The method according to claim 39, wherein the etching fluid comprises hydrofluoric acid.

41. The method according to claim 35, wherein the etching is terminated as soon as an electric current is detected passing through the etched portion of the capillary wall.

42. The method according to claim 35, further comprising protecting the portion of the capillary wall from breakage.

43. The method according to claim 35, wherein the thickness of the portion of the capillary wall decreases during etching.

44. The method according to claim 43, wherein the thickness of the portion of the capillary wall is less than about 50 microns after etching is completed.

45. The method according to claim 35, wherein the electrically conductive portion of the capillary wall remains impermeable to electrolyte and analyte after etching.

46. A method of conveying a fluid comprising analyte and electrolyte into an analytical instrument, the method comprising:

providing a contiguous capillary, comprising:

an inlet end to supply said fluid into said contiguous capillary;

a spray tip to spray fluid out of the capillary; and

an electrically conductive portion of the capillary in proximity to said spray tip, said electrically conductive portion capable of blocking passage of analyte therethrough;

transporting said fluid through said contiguous capillary;

providing an electrode exterior to said electrically conductive portion, said electrode being in electrically-conductive contact with the fluid interior to said electrically conductive portion;

providing a spray counter-electrode in proximity to said spray tip, said spray counter-electrode comprising an opening in fluid communication with the analytical instrument; and

applying a spray voltage between said electrode and said spray counter-electrode to effect electrospray ionization of the analyte exiting the spray tip, whereby at least a portion of the analyte ions is conveyed into the analytical instrument.

47. The method according to claim 46, wherein the electrically conductive portion comprises pores of a size that permit passage of electrolyte therethrough.

48. The method according to claim 46, wherein the electrically conductive portion is electrolytically conductive.

49. The method according to claim 46, further comprising:
providing a second electrode in electrolytically-conductive contact with fluid upstream from the electrically conductive portion; and
applying a voltage between said electrode and a second electrode to effect electrophoresis separation of the fluid within the capillary.

50. The method according to claim 49, wherein the second electrode is in electrically conductive contact with the fluid in proximity to the inlet end of the capillary.

51. The method according to claim 49, wherein the capillary further comprises a second electrically conductive portion through which the second electrode is in electrically conductive contact with the fluid, said second electrically conductive portion being located upstream or downstream from the first electrically conductive portion.

52. The method according to claim 49, wherein the analytical instrument is a mass spectrometer or a mass analyzer.

53. The method according to claim 49, wherein the spray voltage is at least about 500 kV.

54. The method according to claim 49, wherein the electrophoresis voltage is at least about 1 kV.

55. A method of obtaining the mass spectrum of analyte molecules, comprising:
providing a fluid comprising analyte molecules and electrolyte;
providing a contiguous capillary comprising:
an inlet end to supply said fluid into said contiguous capillary;
a spray tip to spray fluid out of the capillary; and
an electrically conductive portion of the capillary in proximity to said spray tip, said electrically conductive portion capable of blocking passage of analyte molecules therethrough;
transporting said fluid through said contiguous capillary;

providing an electrode exterior to said electrically conductive portion, said electrode being in electrically conductive contact with the fluid interior to said electrically conductive portion;

providing a spray counter-electrode in proximity to said spray tip for producing an electrospray comprising analyte ions, said spray counter-electrode comprising an opening in fluid communication with a mass spectrometer;

applying a spray voltage between said electrode and said spray counter-electrode to effect electrospray ionization of the analyte ions exiting the spray tip, whereby at least a portion of the analyte ions enters the mass spectrometer through said opening; and

measuring *m/z* of the analyte ions within the mass spectrometer to provide the mass spectrum.

56. The method according to claim 55, wherein the electrically conductive portion comprises pores of a size that permit passage of electrolyte therethrough.

57. The method according to claim 55, wherein the electrically conductive portion is electrolytically conductive.

58. The method according to claim 55, further comprising:

providing a second electrode in electrically conductive contact with fluid upstream from the electrically conductive portion; and

applying a voltage between said electrode and a second electrode to effect electrophoresis separation of the fluid within the capillary.

59. The method according to claim 58, wherein the second electrode is in electrolytically-conductive contact with the fluid adjacent to the inlet end of the capillary.

60. The method according to 58, wherein the capillary further comprises a second electrically conductive portion through which the second electrode is in electrically conductive contact with the fluid, said second electrically conductive portion being located upstream or downstream from the first electrically conductive portion.

61. The method according to claim 58, wherein the second electrically conductive portion comprises pores of a size that permit passage of electrolyte therethrough.

62. The method according to claim 60, wherein the second electrically conductive portion is electrolytically conductive.

63. A contiguous capillary, comprising:
an inlet end to supply a fluid into the capillary, said fluid comprising analyte;
a spray tip for spraying fluid out of the capillary; and
an electrically conductive portion of the capillary in proximity to said spray tip, said electrically conductive portion capable of blocking passage of analyte therethrough.

64. The contiguous capillary of claim 63, wherein the electrically conductive portion comprises pores of a size that permit passage of electrolyte therethrough.

65. The contiguous capillary of claim 63, wherein the electrically conductive portion is electrolytically conductive.

66. The contiguous capillary of claim 63, wherein the contiguous capillary comprises fused silica.

67. The contiguous capillary of claim 63, wherein the spray tip has a diameter opening of less than about 50 microns.

68. The contiguous capillary of claim 64, wherein the pores permit passage of electrolyte ions having a molecular mass of less than about 300 g/mol.

69. The contiguous capillary of claim 64, wherein the pores at least partially block the passage of analyte.

70. The contiguous capillary of claim 69, wherein the pores completely block the passage of analyte ions having a molecular mass of greater than about 300 g/mol.

71. The contiguous capillary of claim 63, wherein the electrically conductive portion is affixed within a support structure, said support structure capable of holding a buffer solution.

72. The contiguous capillary of claim 63, wherein the electrically conductive portion of the capillary comprises at least about 1 mm of the length of the capillary.

73. The contiguous capillary of claim 63, wherein the electrically conductive portion of the capillary has a wall thickness less than the wall thickness of the adjacent capillary portion.

74. The contiguous capillary of claim 63, wherein the wall thickness of the electrically conductive portion of the capillary is less than about 50 microns.

75. The contiguous capillary of claim 63, wherein the diameter of the spray tip opening is smaller than the inside diameter of the capillary.

76. The contiguous capillary of claim 63, wherein the electrically conductive portion extends about 20 percent to about 50 percent around the circumference of the capillary.

77. The contiguous capillary of claim 63, wherein the electrically conductive portion extends completely around the circumference of the capillary.